Copying answers and steps is strictly forbidden. Same instructions as Mission 1. Do not fold. Thanks!

Problem 41 Your signature below indicates you have:

(a.) I have read Chapter 4 of Gamelin: _____.

(b.) I have read Cook's Guide to Chapter 4:_____.

Problem 42 #4 of section *IV*.1

Problem 43 Let γ_L be the half-circle of radius 1 going from i to $-i$ on the imaginary-axis with $\mathfrak{Re}(z) \leq 0$ for each $z \in \gamma_L$. Calculate

$$\int_{\gamma_L} \frac{dz}{2z-i}$$

Problem 44 Let γ_R be the half-circle of radius R going from R to $-R$ on the real-axis. Find an bound on the modulus of $\displaystyle\int_{\gamma_R} \frac{dz}{z^2+2z+3}$.

Problem 45 #5 of section *IV*.1

Problem 46 #1 of section *IV*.3

Problem 47 Let C be a CCW-oriented loop which does not include $z = \pm 2i$. Calculate the value of $\displaystyle\int_C \frac{dz}{z^2+4}$ in all cases. Draw a picture to illustrate the **three** cases.

Problem 48 #1a, c, g of section *IV*.4

Problem 49 #3 of section *IV*.4

Problem 50 **Prove a polynomial in z with no zeros is constant**. To do this, use Cauchy's Theorem along the following lines: If $P(z)$ is a non-constant polynomial then write $P(z) = P(0) + zQ(z)$ and divide by $zP(z)$ to obtain:

$$\frac{1}{z} = \frac{P(0)}{zP(z)} + \frac{Q(z)}{P(z)}$$

Integrate the identity above around a circle of radius R and you should obtain a contradiction as $R \to \infty$.